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PATENT COOPERATION TREATY  
**PCT**

REC'D 06 DEC 2004

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

PCT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2021204/pc/nu		<b>FOR FURTHER ACTION</b> See Form PCT/IPEA/416	
International application No. PCT/FI2003/000669	International filing date (day/month/year) 12-09-2003	Priority date (day/month/year) 13-09-2002	
International Patent Classification (IPC) or national classification and IPC G05B 19/404, G05B 23/02			
Applicant METSO AUTOMATION OY et al			

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
  - ☐ (sent to the applicant and to the International Bureau) a total of \_\_\_\_\_ sheets, as follows:
    - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
    - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
  - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) \_\_\_\_\_, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- |                                     |              |   |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I    | Basis of the report   |
| <input type="checkbox"/>            | Box No. II   | Priority  |
| <input type="checkbox"/>            | Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| <input type="checkbox"/>            | Box No. IV   | Lack of unity of invention  |
| <input checked="" type="checkbox"/> | Box No. V    | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/>            | Box No. VI   | Certain documents cited   |
| <input checked="" type="checkbox"/> | Box No. VII  | Certain defects in the international application  |
| <input type="checkbox"/>            | Box No. VIII | Certain observations on the international application   |

Date of submission of the demand 01-03-2004	Date of completion of this report 23-11-2004
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Form PCT/IPEA/409 (cover sheet) (January 2004)

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# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International Application No.

PCT/FI2003/000669

## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))  
☐ publication of the international application (under Rule 12.4)  
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

☒ the international application as originally filed/furnished

☐ the description: \_\_\_\_\_ as originally filed/furnished

pages \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☐ the claims: \_\_\_\_\_ as originally filed/furnished

pages \_\_\_\_\_ as amended (together with any statement) under Article 19

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☐ the drawings: \_\_\_\_\_ as originally filed/furnished

pages \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages \_\_\_\_\_

☐ the claims, Nos. \_\_\_\_\_

☐ the drawings, sheets/figs \_\_\_\_\_

☐ the sequence listing (specify): \_\_\_\_\_

☐ any table(s) related to the sequence listing (specify): \_\_\_\_\_

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages \_\_\_\_\_

☐ the claims, Nos. \_\_\_\_\_

☐ the drawings, sheets/figs \_\_\_\_\_

☐ the sequence listing (specify): \_\_\_\_\_

☐ any table(s) related to the sequence listing (specify): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2003/000669

**Box No. V** Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	<u>1-17</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-17</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-17</u>	YES
	Claims		NO

## 2. Citations and explanations (Rule 70.7)

### Documents cited in the International Search Report

D1: WO 0111436 A1  
D2: US 5687098 A  
D3: US 20020173915 A1

The applicant describes the problem of determining hysteresis or backlash in process automation systems. Prior art discloses methods of doing this, but the object of the present application is to provide a new method and apparatus for determining hysteresis or backlash in a normal run in a relatively simple and accurate manner, according to the applicant.

Document D1 (cited in the application) describes a method and an apparatus to statistically determine estimates of one or more process control loop parameters, such as backlash, associated with a device or a control loop within a process control environment. A first signal is measured, for example a signal indicative of an actuator pressure, and a second signal is measured, indicative of an actuator position. A reduced data set is then created from a series of data points and the friction estimate is determined from the reduced data set. A point may be included in the set, for example, if the difference between the actuator position of a point and the actuator position of the previous point exceeds a predetermined threshold (see page 14, lines 8-11). The signals are grouped in the reduced data set into two groups (see figure 4 and page 15, lines 13-15), and a separate line is fitted to the respective data on each side of the friction

.../...

## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Box V

zone, i.e., a separate line fit routine is used for each of the groups 50 and 52 of figure 4 (see page 16, lines 5-7). The friction estimate is then determined from the difference between the two lines (see page 16, lines 11-23).

Document D2 discloses a method of acquiring data to represent relationships over corresponding relationship magnitude ranges between selected signals obtained from a process control device controlling at least a part of a process with that data being acquired during such controlling.

Document D3 describes method for modelling fluid displacements in a porous environment taking into account hysteresis effects by the variation curve of capillary pressure in pores on the basis of saturation with respect to liquid phases.

D1 represents the closest prior art document. The difference between D1 and the claimed invention, according to claims 1-2, 12-13 and 17, is that the claimed invention assumes distance measurements of the data sets in non-linear requirements. The characteristic curves of the valves are first constructed when the distance between the characteristic curves is measured. This reduces the use of specific criteria for the control input and process output measurement pairs by selecting and screening of data. The screening from collected raw data improves the accuracy of the backlash of a valve.

The problem to be solved in D2 and D3 does not address the same problem to be solved in the claimed invention. D2 respectively D3 describes a relationship between conditions of data obtained from a process with data for a specific condition. D2 respectively D3 does not reveal screening of collecting samples of data for the hysteresis based on the characteristic curves.

Hence it is not obvious for a person skilled in the art to modify D1-D3 to solve the same problem as referred in the claimed invention.

The invention according to claims 1-17 is novel, industrial applicable and is considered to involve an inventive step.

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

International application No.

PCT/FI2003/000669

**Box No. VII Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

The claim 15 refers incorrectly to claims 12 to 24, it should obviously be claims 12 to 14.